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"The idea behind RDECOM is to capitalize on existing expertise and intellectual capital and facilitate seamless integration to get technology in the hands of our soldiers faster."

Maj. Gen. John C. Doesburg
RDECOM Transition
Director

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A Conversation with Maj. Gen. Doesburg, Research, Development and Engineering Command (RDECOM) Transition Director

RDECOM Public Affairs

In October 2002, the Army Materiel Command (AMC) established the Research, Development and Engineering Command (RDECOM) to incorporate the research, development and engineering elements of AMC Major Subordinate Commands. The Army and Department of Defense urgently need this new command structure to integrate, mature and demonstrate all emerging technologies while significantly decreasing the time it takes to get these critical capabilities from lab to soldier. Since July 2002, the RDECOM Transition Team, under the leadership of Maj. Gen. John C. Doesburg, has been working towards full establishment of the new command. Maj. Gen. Doesburg took time out of his busy schedule to discuss his role as RDECOM Transition Director and the vision for the new command.



What is the goal of RDECOM?

The overall goal and core mission of RDECOM is to field the right equipment, in the shortest time, for our soldiers. RDECOM is restructuring the Army's research and development, and science and technology organizations under one umbrella organization. This will significantly streamline and integrate our efforts, enabling us to rapidly integrate, mature, demonstrate and deploy emerging technologies.

We have an extremely talented pool of researchers, engineers and scientists, who work hard each day to identify and develop the critical technologies our soldiers need. The command will facilitate increased opportunities for collaboration and partnership so that our staff can work together and tackle problems as a team. We want to break down the stovepipes and bottleneck so that our technology innovations can reach our soldiers in a timely manner. To do this, we need to be agile to rapidly take advantage of technology opportunities whenever they arise. RDECOM will maximize opportunities to capitalize on emerging technologies and our existing expertise to get technology in the hands of our soldiers faster.

What's your role as Transition Director?

As Transition Director, I am responsible for leading the planning process for the establishment of the new Command. I am excited about my new role and have a strong commitment to seeing this command reach its vision to field technologies that sustain the Army as the premier land force in the world.

I lead the RDECOM Transition Team, and we are completing several action steps to bring the Command on-line. In fact, we have accomplished a great deal since the Transition Team was established in July 2002. The Provisional RDECOM was established in October 2002, and, at the same time, the Army Research Laboratory and Army Materiel Systems Analysis Agency became the first organizations officially assigned to the command. In November 2002, we completed Memorandums of Understanding for a joint relationship between RDECOM, Army Test and Evaluation Command (ATEC) and the U.S. Training and Doctrine Command (TRADOC).

How will the Command be organized?

Similar to the Soldier and Biological Chemical Command, RDECOM will operate under a Board of Directors. The Board membership will include the Technical Directors, who oversee each organizational element of the command, as well as the Commander and Deputy Commanding General. We have open sessions to provide staff and other stakeholders the opportunity to share their ideas and technology solutions. We also have closed sessions where we handle some of the

tough actions that need to be taken on as a large command.

The RDECOM Deputy Commanding General will be responsible for overseeing "system of systems" integration and will have charge of the Agile Development Center that will be located in Fort Belvoir, Va.

How will the Agile Development Center support the Command's mission?

Although in theory located in Ft. Belvoir, Va., the Agile Development Center, or "skunk works," is not a place. Most people think it's going to be a place where you can bend metal, fabricate or put things together. Those actually exist at all the Research Development and Engineering Centers in one way or another. So, the question is not "where are you going to bend metal?" If we're going to be agile, we've got to pull the right minds and the right intellectual power together from the start. Then, you can turn to the most appropriate integration facility to now build it for you.

What is the concept behind the Capability Managers and Technology Integrators?

The Board of Directors will select Capability Managers and Technology Integrators from within the Command to serve two-year terms. The Capability Managers will be responsible for ensuring that our research and development efforts are focused on providing capabilities for soldiers rather than responding to requirements. The Technology Integrators will work with each RDECOM element to facilitate seamless integration of technology.

We are primarily establishing this command as horizontal integration in the system of systems approach. Thus, our focus will be on providing capabilities—such as survivability and lethality—those critical capabilities that the Army needs to protect our forces. For example, most people think of lethality as missiles and guns because they destroy the enemy on the battlefield or protect the force. Lethality is actually much greater than that and can be measured in many different ways. Speed has a direct impact on lethality, so if you think of it in that context, the Capability Manager needs to assess the various elements that make up lethality. We are going to have to take risks and make tradeoffs, and we need a Capability Manager who is looking at that perspective. Technology Integrators, on the other hand, are looking at very specific technology and trying to horizontally integrate that technology across all of the different Command areas, whether it's missiles, artillery or heavy systems. Technology integration will help us achieve agility to decrease the time it takes to go from lab to field.

The reason the Capability Managers and Technology Integrators serve two-year appointments is to leverage off of something the military does

very well—bringing in fresh ideas and change. One of the ways to do this is to change leadership or responsibility at set intervals. For example, the current individual who oversees survivability previously only focused on that specific area. We are now expanding the horizon of that individual greatly by pairing that person's expertise with other subject matter experts to bring the best minds together to solve a problem. .

What is the management philosophy for RDECOM?

There are many catch phrases you'll hear associated with the new Command including knowledge-based management and virtual and collaborative environment. These are more than just buzzwords; they represent in practice how RDECOM will get technology in the hands of soldiers faster. These words translate into agility, collaboration, resource leveraging and innovation.

RDECOM supports knowledge-based management by consistently taking the knowledge we gain and returning it back to the organization. When the Capability Managers' and Technology Integrators' two-year terms have ended, they return to their respective Command organization. Meanwhile, new people from within the command step into these roles so that the Command benefits from a talented pool of diverse perspectives and expertise.

If we're going to truly be an integrated and collaborative Command, then we need to provide a central location where our intellectual power can come together. That's why we are creating a virtual and collaborative environment, such as the Agile Development Center. In addition to video teleconferences and dedicated Web sites, we are investigating other virtual working tools. Specifically, we are looking into ways to take advantage of the Simulation, Training and Instrumentation Command's virtual capabilities.

Explain how RDECOM will partner with other organizations, such as the Army Test and Evaluation Command (ATEC) and the U.S. Training and Doctrine Command (TRADOC)?

To ensure seamless integration and coordination, ATEC and TRADOC are invited members of the Board of Directors. Involving ATEC and TRADOC early on will result in streamlined decisions about how these partners can support emerging technologies. One of the things we haven't done well in recent past is vest ourselves for success either in combat developments, testing or science and technology because we tended to work each one of them separately. Each one had a time and a place in which it needed to occur.

The general premise is to give the TRADOC schools and TRADOC

headquarters an opportunity very early on to see emerging technologies, understand them and start to make decisions on what they need to do not only from a combat developments perspective, but also from a requirements perspective. Without knowing what's in the realm of the doable in technology, there's a tendency to write requirements based on a process that says, "If this is what the last piece of equipment required, then the update should be able to that and more, so that's what I want."

Also, when we develop a technology, we turn it over to the Program Managers (PMs) and Program Evaluation Offices (PEOs) and say, "here it is, now do something with it." Under RDECOM, we're instead going to work it from a system of systems approach. This means, we will say, "I've been working on this technology, evaluated it in some sort of testing protocol. We know that it generally can do what we want it to do. TRADOC has looked at it and determined it meets a future capability. What do you think?" Because the PEOs and the PMs have been involved early on in research and development and we've had some upfront testing, they can ask some specific questions.

How will RDECOM meet its mission "to get technology in the hands of soldiers faster?"

We cannot wait around for a revolutionary breakthrough to solve what we think is a requirement when in fact what we need to do is focus on capabilities and assess areas for technology insertions. Some people call it spiral development—to allow us to bring technology in quicker to the soldiers. Our process needs to allow us to insert technology as it matures so that we eventually can reach 100 percent of the desired result.

If we are in fact going to transform the Army's research and development programs, we need to focus our efforts on developing capabilities rather than responding to requirements. If the capability is survivability, you now have this wide array of things that in fact can provide survivability. And, when you put two "things" or technologies together, you should have an increased capability or survivability. Taking this a step further, when you put four, five or six technologies together, the combination of these results in an overwhelming capability to provide survivability.

Another example of how we can better coordinate our efforts is our air defense systems. In the past, we built air defense systems to shoot helicopters and fast moving systems out of the sky. Over the years, we continued to build new air defense systems. But, we didn't take into account that capability we already had in those existing individual systems that could benefit the entire air defense system. This is what RDECOM will facilitate: a system of systems approach to research, development and testing.

How will the command keep pace with ever-changing technology?

We've been told for a fairly long time that computer technology, for instance, is changing every 18 months. If you talk to industry, it's changing every nine months. Well, if you believe that technology changes every 18 months, then what we field in Land Warrior will be five generations behind computer technology. If you believe it changes every nine months, it's even more outdated when we field it. So, the question is, how do you break that generational gap? How do you get it down to two or three generations? The only way to do that is through this technology insertion process I mentioned earlier. If you go by the standard process we use today, which says you settle on a technology and bring it to development and fielding, then you're always going to be as far behind as we are today. I believe our people work too hard to see their work deployed after technology has surpassed it.

What's the timeframe for a fully functional RDECOM?

Currently, the goal is for AMC to issue a Permanent Order activating RDECOM in October 2003. In the meantime, the Transition Team is working to establish the Agile Development Center, or "skunk works" in March. And, in June, it is anticipated that the remaining subordinate elements will be assigned to the Command. As we move towards full stand up of this command, the Transition Team and myself remain committed to making this a smooth transition. Future editions of RDECOM Magazine will keep you updated on our progress and recent activities.

RDECOM Elements include the following:

Aviation and Missile RDEC, Redstone Arsenal, Huntsville, Ala.
Armaments RDEC, Picatinny Arsenal, N.J.
Communications-Electronics RDEC, Fort Monmouth, N.J.
Tank-Automotive and Armaments Command RDEC, Warren, Mich.
Natick Soldier Center, Natick, Mass.
Edgewood Chemical Biological Center, Aberdeen Proving Ground, Md.
Army Research Laboratory, Adelphi and Aberdeen Proving Ground, Md.
Army Materiel Systems Analysis Agency, Aberdeen Proving Ground, Md.
Science and technology portion of Simulation, Training and Instrumentation Command, Orlando, Fla.
International Cooperation Programs Activity, Alexandria, Va.
Field Assistance in Science and Technology, Fort Belvoir, Va.
Research and development standardization groups around the world

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The Army's thrust to field a lighter, more deployable force will require improved situational awareness at all echelons. Networks of unattended ground sensors will fill at least part of that role of trading armor for information.

Networked Unattended Ground Sensors

Army Research Laboratory

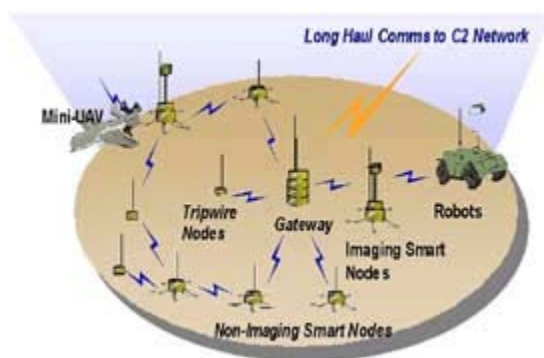
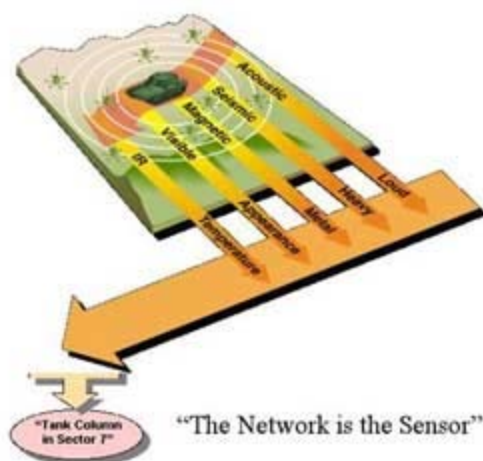
ADELPHI, Md.—The Army Research Laboratory is working with the Communications-Electronics Command to provide advanced unattended ground sensors capable of detecting and tracking targets in areas where soldiers cannot go.

A force of these unattended, highly automated sensors—dispersed by ground forces, helicopters and artillery or integrated in small, unmanned aerial or ground vehicles—will take on the dangerous mission of gathering information for situation awareness and targeting. These advanced sensor nodes connect into intelligent arrays and link to commanders, providing timely knowledge of terrain, battle space conditions and forces.

"The concept of networked unattended ground sensors centers around the notion that a group of individual sensor nodes, each with a group of diverse, low-cost sensor types, can provide crucial sensor information that stand-off sensors cannot," says John Eicke, chief of the laboratory's Signal and Image Processing Division. The effectiveness of these nodes is based on two fundamental concepts, Eicke adds. They employ a range of diverse sensors types and they rely on the fusion of the outputs from each node to maximize collaboration and minimize false or redundant reports.

Sensor Configuration

The configuration requirements for an unattended ground sensor network suitable for fielding is still not well defined. Following the model shown below, unattended ground sensors are used in groups called clusters that are made up of discrete sensor nodes and a gateway that fuses the results from individual nodes and communicates cluster information back through the command and control network.



The Army Research Lab is evaluating a wide variety of prototype unmanned ground sensors that could be networked to support the Objective Force.

The tripwire nodes are very low-power, inexpensive, simple nodes that listen all the time for potential targets. When they detect something, a "wakeup" call is sent to the more sophisticated "smart" nodes to determine what is present. The "smart" nodes have multi-sensor processing and fusion capabilities to detect, classify and track targets of interest. The gateway node serves as the interface between the local cluster and the command and control assets.

Types of Sensors

"The variety and sophistication of battlefield sensors has expanded greatly over the past few years and will continue to grow. While each sensor individually may provide modest performance, when deployed in large numbers and when nodes employ a range of sensing modalities, they can be highly effective," Eicke points out.

A number of different types of sensors are being explored for networked sensors, but the emphasis is on low cost, he adds. Sensor types being explored include acoustic, seismic, magnetic, imaging infrared and

visible, radio frequency, and simple radars.

There is an increasing focus on small, low-cost imagers suitable for fielding in large numbers. These cameras can provide imagery needed for accurate target identification while remaining inactive unless a target is actually present. Eicke points out that combined with aided or automatic target recognition capabilities, imagers will provide the best target identification capabilities of any single sensor.

"The use of the ensemble of sensing modalities is the key to robust, accurate operation of networked unattended sensors. 'You can't fool all the sensors all the time' is the concept," Eicke explains.

Obstacles

The greatest obstacles to implementing an effective array of sensors are communications and networking. Technical barriers include transmission range, effects of terrain, achieving a low probability of intercept and detection, power usage, and effectiveness in high electromagnetic radiation environments. However, there are certain aspects of networked sensors that reduce the severity of these issues. With the exception of the imagers, the types of sensors employed will require relatively little bandwidth. The Army is developing a radio specifically designed to use low data bandwidth, frequency agility and other features to provide a link for networked unattended ground sensors.

Networked unattended ground sensors can be used to provide accurate intelligence, surveillance and reconnaissance (ISR), and targeting information on a wide range of ground and air targets. Specific mission areas where networked sensors can play a key role include ISR missions, targeting, operations on urbanized terrain, perimeter defense, targets in difficult terrain and minefield replacements.

The Army's thrust to field a lighter, more deployable force will require improved situational awareness at all echelons. Networks of unattended ground sensors will fill at least part of that role of "trading armor for information."

"These sensors can provide high fidelity sensing capabilities and provide our soldiers with revolutionary and robust new capabilities to sense enemy forces before they themselves are detected," Eicke concludes.

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Penn State, Picatinny Sign Partnership

Agreement

Jack Crowley

Armaments Research, Development and Engineering Center

PICATINNY ARSENAL, N.J.—The highlight of a full day of briefings at Picatinny Arsenal by senior scientists and engineers from the Pennsylvania State University Applied Research Laboratory and Center for Innovative Sintered Products was the signing of an Education Partnership Agreement by Tank-Automotive and Armaments Command/Armaments Research Development Engineering Center (TACOM-ARDEC) Penn State's Applied Research Laboratory.

TACOM-ARDEC Technical Director Michael Devine (left) and Associate Director of Penn State's Applied Research Laboratory Dr. Thomas Donnellan sign an Education Partnership Agreement. Photo by Jack Crowley



"We are certainly pleased to execute this Partnership with Penn State," said TACOM-ARDEC Technical Director Michael Devine. "Many of our top engineers and scientists are proud Nittany Lion alumni. We look forward to expanding our relationship near-term and should draw great mutual benefit from this new partnership."

More than 40 ARDEC employees and contractor representatives attended the Penn State Lab Capabilities Overview, which was held in December 2002 and hosted by the Warheads, Energetics and Combat-Support Center and the Army Heavy Metals Office.

The Penn State representatives discussed their work and capabilities in a wide range of topics. For example, Dr. Tim Eden discussed Materials Processing while Dr. Steven Johnson related Penn State's experience in novel methods for Shape Charge Liner manufacturing. Other topics included Net Shape Powder processing, Composite Technology, Laser Processing, Smart Fencing, Intelligent Controller applications and Factory Modeling and Simulation techniques.

For further information regarding the Penn State Applied Research Laboratory briefings, please visit <http://www.arl.psu.edu/>

(Editor's Note: Bill Sharpe, Army Heavy Metals Office contributed to this article.)

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"This agreement is an ideal way to accelerate cooperative efforts in the area of homeland security."

Jim Zarzycki
Edgewood Chemical
Biological Center
Technical Director

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Edgewood Center Partners with EPA on Homeland Security Research and Development

Edgewood Chemical Biological Center

ABERDEEN PROVING GROUND, Md.—The Environmental Protection Agency recently signed a Memorandum of Understanding with the Soldier and Biological Chemical Command to establish a framework for collaborative research and development efforts relating to homeland security.

"This agreement is an ideal way to accelerate cooperative efforts in the area of homeland security," said Edgewood Chemical Biological Center Technical Director Jim Zarzycki. "Our organizations are perfectly matched...both SBCCOM and the EPA have technology to share and learn about, and there are numerous areas where we can collaborate."

Research and development efforts specifically targeted appear in the EPA's Strategic Plan for Homeland Security and include building security, water security and rapid risk assessment. The agreement will expedite research and development of new tools and technologies that can be implemented in support of homeland security efforts by federal, state or local government agencies. In addition, the agreement will also serve to maximize resources, minimize duplication of effort and accelerate technology development.

The EPA is one of the Center's many federal partners. The Center also has numerous agreements with other federal agencies to conduct cooperative research and testing activities. Many of these agreements support homeland security goals.

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"We're competing with readily available fast food and restaurant fare, and we're trying to keep the soldier in the dining hall."

Elizabeth Painter
Food Technologist,
Combat Feeding Program

Military Menus Get Fit but Keep Flavor

Natick Soldier Systems Center

NATICK, Mass.—Less fat and sodium. More complex carbohydrates and fiber. All the flavor. Healthier menus are part of the Armed Forces Recipe Service's ongoing efforts to improve the quality of the military's food service. With 1,700 standardized recipes that expand by nearly one per week, the list also is being modified to reflect changes in consumer tastes.

"We're serving garrison dining halls on land and at sea. We want to keep soldiers fit by reducing the fat to an acceptable level," said Elizabeth Painter, a food technologist with the Combat Feeding Program at the Soldier Systems Center in Natick, Mass.

Painter along with Anthony Lee, also a food technologist, completed a three-year project to revise military recipes to meet healthier guidelines, but the Recipe Services' mission continues.

"We're competing with readily available fast food and restaurant fare, and we're trying to keep the soldier in the dining hall," Painter said. "{The recipes} should reflect what's available on the outside. We've developed new entrees that include a lot of diverse, ethnic foods. We incorporate authentic flavor profiles from specific regions to make it a satisfying experience that brings them back."

Wrap sandwiches, lime chicken soft tacos, southwestern shrimp linguine and Asian barbecue turkey fillets are among the newer menu items. Halal recipes are also part of the mix and were sent to Guantanamo Bay, Cuba, during the spring to assist the military in feeding the alleged Al-Qaeda and Taliban prisoners detained at Camp X-Ray.

For improved nutritional demands, Painter and Lee have adopted a number of strategies. Using dried plum puree instead of vegetable oil makes a non-fat, yet moist fudgy brownie. In addition, replacing half of the vegetable oil in banana bread with applesauce or using non-fat cream cheese and egg whites to make a light cheesecake dramatically lowers the fat and calorie count.

"We don't want to compromise the recipe. If the fat can be lowered, it is lowered, but some dishes like buffalo chicken wings are intrinsically higher fat options," Painter said.

Outside the military mission, the Recipe Service recently assisted the U.S. Department of Agriculture in performing yield studies on more than 700 food items and then re-wrote the department's Food Buying Guide for Child Nutrition Programs. The School Breakfast and Lunch Programs, as well as other Adult and Child Nutrition Care Programs and

the Summer Food Service Program, use the guide to purchase the right amount of food.

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Edgewood Center's Technology Transfer Program Promotes Partnering with Private Industry

Edgewood Chemical Biological Center

ABERDEEN PROVING GROUND, Md.—Federal laboratories, like the Edgewood Chemical Biological Center, are one key source for important scientific advancements and discoveries each year. Partnering with industry and other government agencies to maintain our nation's leadership in cutting-edge chemical and biological technologies is an important aspect of the Center's business strategy. Technology Transfers are vehicles that allow the Center to share its discoveries with the private sector and benefit the warfight by bringing private sector discoveries back to the government.

One of the most recent technology transfers took place with Chesapeake PERL, a start-up biotech firm operating from a University of Maryland Technology Incubator. The collaborative effort involves developing the recognition component of sensors that detect biological threat agents – a valuable product for both national defense and homeland security objectives.

While Chesapeake PERL was able to tap the Center's scientists and technologies through this partnership, the Center was able to access a proprietary technology of great interest to the military. This past year, the Center and Chesapeake PERL completed a successful proof-of-principle demonstration under the Cooperative Research Development Agreement. Chesapeake PERL obtained \$1.5 million in private investor funding, won the Maryland Biotech/Life Sciences Incubator Company of the Year Award, and was featured in more than 20 news articles, including FORTUNE Magazine's "Coolest Companies of 2002," which featured results from the collaboration with the Center.

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Directors Chosen as Meritorious Executives

Natick Soldier Systems Center

NATICK, Mass.—President George W. Bush named the directors of the Natick Soldier Center in Natick, Mass., and Edgewood Chemical Biological Center in Edgewood, Md., meritorious executives for 2002. Philip Brandler at Natick and Joseph Zarzycki at Edgewood are among 293 career members of the Senior Executive Service awarded the rank.

"These senior executives are being honored for their outstanding leadership accomplishments in some of the nation's most critical programs, such as health, commerce, education, environment, international affairs and the national defense," said Kay Cole James, U.S. Office of Personnel Management director, in a news release.

The recognition is part of the Presidential Rank Awards intent to honor a group of senior executives who have provided exceptional service to the American people during an extended period of time. In addition to the meritorious executive awards, 55 senior executives received the distinguished executive rank.

Award winners for distinguished or meritorious service are chosen through a rigorous selection process. They are nominated by their agency heads, evaluated by boards of private citizens and approved by the President. The evaluation criteria focus on leadership and results. Distinguished rank recipients receive a lump-sum payment of 35 percent of their base pay; meritorious rank recipients receive 20 percent of base pay. All recipients receive a framed certificate signed by the President.

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Insignia Contest Open to Government Employees

RDECOM Public Affairs

ABERDEEN PROVING GROUND, Md.—Maj. Gen. John C. Doesburg, RDECOM Transition Director, is holding a contest among government employees to develop a Distinctive Unit Insignia for the new RDE Command. All designs must be submitted to Mike Dailey no later than 5 pm on Feb. 21, along with a written description of the insignia and an explanation of the symbolism of each insignia component. Designs may be submitted in hard copy or in email. The judging panel will include Maj. Gen. Doesburg, Brig. Gen. Cartwright

and the Directors/Technical Directors of the RDECOM elements. The contest winner will be announced on or about March 31. The winner will receive the first RDECOM coin and a framed copy of the insignia signed by Maj. Gen. Doesburg, Brig. Gen. Cartwright and the Technical Directors. For specific information about the insignia requirements and contest details, please click on this link: [insignia memo](#)

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Command News Briefs

Easier Identification of Combat Vehicles

Communications-Electronics Command

The Recognition of Combat Vehicles is a PC-based, thermal ID training package developed by the Communications-Electronics Command RDEC Night Vision and Electronic Sensors Division and NV/RSTA. The purpose of ROC-V is to train soldiers using thermal imaging systems to correctly identify tactical combat vehicles.

The Joint Forces Command Joint Combat Identification Evaluation Team sponsors the training, which is distributed to the service schools via the Simulation, Training and Instrumentation Command's Web site. The schools download the program, make CDs and deliver them directly to students. Future training delivery concepts under consideration include direct online Web training supplemented with limited CD distribution.



ROC-V's version 9.0 has many added features to reduce fratricide. The most significant changes are the number of vehicles in the package and the addition of "visible" imagery identification cues to the previously thermal-only training program. The current version only teaches identification of 47 vehicles, whereas version 9.0 trains users to identify 99 vehicles including Surface to Air Missiles and SCUD missile carriers. Soldiers will learn to identify all vehicles by their visible identification

cues at various ranges and aspects, as they would view them through day sights, binoculars or the naked eye.

Advanced Powertrain Simulation

Tank-Automotive & Armaments Command

The Tank Automotive and Armaments Command Research Development and Engineering Center's National Automotive Center is on the leading edge of simulation technology, and will soon apply this technology to hybrid electric and fuel cell vehicles. A small working group was created in an effort to model and evaluate the performance of advanced, heavy-duty powertrains.

The amount of data that can be included in the software is quite vast. A vehicle's engine, generator, motors, transmission, wheel configuration, brakes and many other components can be modeled with a high degree of detail. In addition, the environment in which the virtual vehicle is tested can be defined. The terrain, surface friction, grade, precipitation and temperature can all be inputted into the course model. This gives the user the ability to test a vehicle in several kinds of conditions.

This simulation effort can benefit the Army in its Future Combat System selection process by conducting simulations on the concept vehicles' proposed powertrain systems.

Edgewood Center Researcher Among 10 Outstanding People of the World

Army Research Laboratory

The honors keep coming for Edgewood Chemical Biological Center researcher Dr. Jennifer Sekowski, who was among those to receive the Junior Chamber of Commerce's Ten Outstanding People of the World award. The award honors 10 individuals each year from around the world between the ages of 18 and 40 for scientific, entrepreneurial and personal achievements. This awards falls on the heels of Dr. Sekowski being selected a recipient last year as one of the Ten Outstanding Young Americans.



Dr. Sekowski was selected in part because of her community service with the "Kids in Chemistry Program," and her discovery of a unique protein while working under a Department of Defense grant for breast cancer research.

A civilian employee with the Center since 2000, Dr. Sekowski is a principal investigator on two major toxicology projects — the study of low level exposure to chemical warfare agents and an effort to develop better detection and identification measures for biological threat agents at the strain level.

Evaluating Concepts for a Future Combat System-Equipped Objective Force

Edgewood Chemical Biological Center

The Army Research Laboratory has relied on the use of human performance models to assess the effectiveness of command and control (C2) organizational designs for nearly a decade. These models are based on representations of actual or conceptual tasks and functions performed by a group of people engaged in various military missions, within conceptual and actual military organizational designs, under various environmental conditions, and using different types of actual or prototype communication and information technologies.

The need to rapidly develop these kinds of models has become increasingly important with requirements for evaluating, in short timeframes, alternative concepts for the "right" mix of personnel, tasks and technologies proposed for the Future Combat System-equipped Object Force. To meet this requirement, the laboratory sponsored the development of Command, Control, and Communications: Techniques for the Reliable Assessment of Concept Execution, or C3TRACE, modeling environment. This environment can be used to create models to evaluate the effects of alternative, new or prototype communications and information technologies on C2organizational, personnel and system performance.

C3TRACE conducts modeling through a graphical user interface that provides a Microsoft Windows look and feel display for easy development of models to evaluate extensive "what-if" C2 concepts. In addition, these evaluations can be done without the need for live, human-in-the-loop exercises that are both costly and time consuming to execute. Further, C3TRACE can be used to evaluate any kind of organizational design for which personnel, performing real or conceptual tasks and functions, using actual or prototype technologies, can be defined.

Hardened Subminiature Telemetry and Sensor Systems

Army Research Laboratory

Managed by the Army Simulation, Training and Instrumentation Command, the Hardened Subminiature Telemetry and Sensor Systems program focuses on the development and demonstration of lightweight and small packages of advanced instrumentation and telemetry suited for

the high acceleration environment involved in gun-launched munitions.



These systems leverage Army Research Laboratory, Defense Advanced Research Projects Agency and industry for recent advances in microelectronics to provide on-board instrumentation suites that will survive and operate in the harsh environments that projectile systems experience during launch, flight and impact. Army Research Laboratory has provided systems engineering and design support for miniaturized inertial sensor suites, telemetry transmitters, data acquisition devices, rugged S-band antennas and batteries for numerous ballistic applications in large, medium and small caliber.

The laboratory also has fabricated prototypes and performed both laboratory and flight experiments of various telemetry and sensor subsystems. Examples include the design and delivery of flight instrumentation units for the Navy Advanced Gun System as well as the Counter Mine Counter Obstacle Program. In addition, this program has led to the development of constellations of internal sensors that measure in-flight projectile behavior, which is critical to the successful development of Army Future Combat Systems programs such as Multi-Role Armament and Ammunition Suite, Mid-Range Munition and Smart Cargo Projectile.

Modeling and Simulation Vehicle Design, Evaluation and Development

Tank Automotive Research Development and Engineering Center

The Tank-Automotive and Armaments Command, Tank-Automotive Research, Development and Engineering Center Ground Vehicle Simulation Laboratory's computer-based models are capable of predicting measures of vehicle dynamic, agility and structural integrity performance. Their unique motion-based simulators are used to place users, vehicle subsystems or full vehicles in a variety of dynamic environments that accurately reproduce motion disturbances experienced during ground tests or field operations.

The analytical simulation software offers the ability to conduct engineering performance evaluations and assessments. The physical simulation capabilities offer both combat and tactical vehicle systems and subsystem level results to augment and refine experiments conducted at the proving ground and to conduct unique simulations evaluations not available elsewhere. The laboratory is home to two of the Army's most unique motion base simulators, the Ride Motion Simulator

and Crew Station/Turret Motion Base Simulator.

Blast Countermunition Warheads

Army Research Laboratory

In order to protect very lightweight combat systems such as those proposed for the Future Combat System program, reliance must be placed on Active Protection Systems. At the Army Research Laboratory, the Kinetic Energy Active Protection program is developing critical technologies for insertion into the joint Tank-Automotive and Armaments Command; Armaments Research, Development and Engineering Center; and Army Research Laboratory Full Spectrum Active Protection Technology Program. These technologies include defending against tank-launched and kinetic energy projectiles that are launched at velocities ranging from 1.5 to 2 kilometers per second.

A further objective of the research is the definition of a countermunition warhead that is sufficiently robust to disrupt all types of large incoming threats. Although more experiments are needed to define optimal engagement approaches, blast warheads for full-spectrum active protection systems seem sufficiently robust for future integration into system demonstrations, which should lead to integration into Future Combat System.

Single Shelter Switch Problems in Afghanistan and Uzbekistan Resolved

Communications-Electronics Command

While engaged in Operation Noble Eagle, the 35th Single Brigade experienced serious operational difficulties with the Single Shelter Switch that severely limited telephone services to deployed troops. Whenever more than 40 phones were connected into a network through the Single Shelter Switch, the network became unstable and failed. The reduced communications capability faced by the 35th Single Brigade was not only troubling from an immediate operational standpoint, but also raised concerns about the reliability of the Army's newest switches.

The 35th Signal Brigade Commander asked the Communications-Electronics Command Software Engineering Center to provide urgently needed technical support. The Center responded immediately by developing a concurrent two-pronged approach: (1) support by telephone and email to the Signal unit to gather technical information and (2) arrangements to send an experienced software engineer to Uzbekistan in case the problems could not be resolved remotely.

The Software Engineering Center, along with its supporting contractor, General Dynamics, utilized an aggressive methodology of collecting as

much information as possible from the user, replicating stated problems in the communications laboratory and immediately disseminating recommendations to the field. As results of these cooperative efforts, all the 35th Signal Brigade's issues were resolved a few weeks after the initial reports of problems. All lessons learned from this encounter have been posted on the Software Engineering Center Web site for the benefit of all Single Shelter Switch users.

Edgewood Team Supports Cooperative Defense Initiative

The Edgewood Chemical Biological Command has assembled a team of nuclear, biological and chemical (NBC) defense equipment experts to work with the U.S. Central Command in a Cooperative Defense Initiative against weapons of mass destruction. The team will work with the Ministries of Defense from Saudi Arabia, Bahrain, Qatar, Kuwait, United Arab Emirates, Oman, Jordan and Egypt. The Center's equipment evaluation team has traveled to five of the eight countries involved in the cooperative defense program over the last three years. The team tests, inspects and reports the readiness condition of the host nation's detection, protection and decontamination equipment. In addition to assessing U.S. manufactured equipment, the Edgewood team also looks at equipment from other nations, including England, Germany, France, Czechoslovakia, Russia, Korea and China. Central Command and the Cooperative Defense Initiative nations use this information to improve the NBC defense posture of the host nation. In addition to the defense initiative program, the Center hosted an equipment seminar for NBC officers from Bahrain and Qatar in October 2002.

Investigation Team Zeroes in on Errant Hellfire Missile Launch

*By Jim Bowne
U.S. Army Aviation & Missile Command*

REDSTONE ARSENAL, Ala.—During a training exercise held in June 2001, at Fort Bragg, N.C., a Laser Hellfire missile was fired from a Kiowa Warrior aircraft at a stationary target 5.8 kilometers down range. However, shortly after leaving the rail, the missile flew straight up and impacted about 1.8 kilometers outside the direct Surface Danger Zone. The missile went off-range, landed in a recreation area and caught fire upon impact. Fortunately, the recreation area was closed, and no one was injured.

Through testing, modeling and simulation, the investigation team determined that excessive roll rates cause errant Hellfire missiles, such as in the Fort Bragg incident.

As a result of this "errant missile" incident, the U.S. Army Aviation and Missile Command's (AMCOM's) Research, Development and Engineering Center (RDEC) was tasked to lead an investigation, and

AMCOM issued a Safety of Use message.

An instrumented Hellfire missile firing from a Kiowa Warrior. Photo courtesy of Traci Ray, AMRDEC



The goal of the investigation was two-fold: (1) to identify the root cause of the incident and (2) to demonstrate a solution that would return the Hellfire Surface Danger Zone to the area defined prior to the Safety of Use message as quickly as possible.

Through testing, modeling and simulation, the investigation team determined that excessive roll rates cause errant Hellfire missiles, such as in the Fort Bragg incident. The excessive roll rate causes the missile gyro to "tumble," or lose flight path alignment, when the mechanical gyro on the air-to-ground missile hits either gyro stop prior to the missile achieving aerodynamic control. The aircraft, launcher and missile interaction at launch often imposes this high initial roll rate to the missile.

In addition, the team identified that the mechanism that holds the missile on the launch rail needs to be modified to prevent the transfer of roll energy into the missile at launch. The RDEC hopes to receive money to develop and test this modification, which is less expensive than missile modification.

According to Dr. Robin Buckelew, Director of the RDEC's Missile Guidance Directorate, the investigation, which began in August 2001, is on going. "The most important lesson learned," she said, "is that an investigation is a team project."

Because the incident involved an aircraft and a missile, the investigation team members came from several Team Redstone organizations and industry. Traci Ray and Kelly Craig, both from the RDEC, served as Team Leaders, with Ray serving as lead until September 2002. Craig is the current team lead. Additional team members included personnel from AMCOM's Safety Office, Army Aviation Rockets and Missiles Project Manager's Office, Apache Program Management Office, Kiowa Warrior Program Management Office, Redstone Technical Test Center and various contractors.

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